THE BoatSwains Art:

OR THE COMPETE BOAT-SWAIN.

Wherein is ſhewed a true Proportion for the Maſting, Yarding, and Rigging of any Ship, whoſe Length, Breadth, and Depth is known: with Rules for the Sizes and Lengths of all ſorts of Rigging that belongs to any *SHIP*.

Alſo the uſe of an opening Scale, that if the length of the Main Maſt be put upon it with a pair of Compaſſes, you may meaſure upon the Scale the Lengths and Thickneſs of all the other Maſts and Yards; and alſo the Sizes, the Lengths and the number of Fathoms of every Size for the Rigging of any *SHIP*, without altering the Scale.

Alſo here is added a Plain and Eaſie Rule for Rigging any Ship by the length of its own *Maſts* and *Yards*.

By HENRY BOND, Teacher of *Navigation*, *Surveying*, and other parts of the *Mathematicks*, near *Ratcliff-Croſs*.

The Scale is made in Braſs or Wood by *Joſeph Hone* on *Tower-Wharf*.

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To the READER.

COurteous and Judicious Reader; thou haſt here preſented to thee an exact Method and Direction for the *Maſting*, *Yarding*, and *Rigging* of any *Ship* whatſoever: All that is expected from thee, is but thy acceptance, and a Charitable Cenſure; Both which out of doubt thou wilt freely grant: The main end that is intended in it, is for the help and Direction of Young Men, that are willing to have ſome ground for what they ſhall undertake in this kind, and not to go on hand over head. If any ſhall reap benefit by it, (as out of doubt many will,) the Author hath his deſire.

Vale.

A Table of the Lengths and thickneſs of the Maſts *and* Yards *of a* Ship *that is* 75 *Foot by the* Keel, 29½ *Foot at the* Beam, *and* 13 *Foot in* Hold, *which is of the Burden of* 300 *Tun.*

	Length in Feet.	*thickneſs in Inches.*
THE Spritſail Topſail Yard	14	4
The fore Topgallant Yard, & the Spritſail topmaſt	16	5
The main Topgallant Yard	18	6
The fore Topgallant Maſt	19	6
The Mizon Topſail Yard	20	6
The main Topgallant Maſt	21	7
The Mizon Topmaſt	27	8
The fore Topſail Yard	31	9
The main Topſail Yard, 11 Inches, and croſs Jeck Yard	36	7½
The fore Topmaſt	37	13
The main Topmaſt	42	14
The Spritſail Yard	50	16
The Mizon Maſt	52	17
The Mizon Yard	51	16
The fore Yard	62	20
The Bouſprit	66	22
The main Yard	74	24
The fore Maſt	75	25
The main Maſt	84	28

A Table of the Names, the Sizes, the Number, and the lengths of each Rope, of Rigging, belonging to the fore propounded Ship.

1. *Cordage of* 1 *Inch* $\frac{1}{10}$ *part.*

		Fa.	Fa.
2	Fore Topgallant Braces	25	50
4	Fore Topgallant Bowling Bridles	4	4
2	Fore Topgallant Lifts	22	44
8	Main Topgallant Lanniards	$1\frac{1}{2}$	12
4	Main Topgallant Bowling Bridles	1	4
1	Main Flag-Staff-Stay	11	11
8	Mizon Topmaſt Lanniards	$1\frac{1}{2}$	12
1	Fall of the Mizon Topſail Cranlines	36	36
1	Mizon Topſail Bowlings	$12\frac{1}{2}$	25
2	Mizon Topſail Braces.	17	34
34			232

2. *Cordage of* 1 *Inch* $\frac{1}{10}$ *parts.*

8	Lanniards of the Spritſail Topmaſt	$1\frac{1}{2}$	12
2	Falls of the Spritſail Topmaſt Tackles	6	12
1	Fall of the Spritſail Cranlines	18	18
1	Spritſail Topſail Halliard	6	6
2	Spritſail Topſail Lifts	5	10
2	Pennants of the Spritſail topſail Braces	2	4
2	Spritſail topſail Braces	10	20
2	Spritſail topſail Cluelines	10	20
2	Fore topmaſt Tackle Falls	$13\frac{1}{2}$	27
2	Falls of the Fore topgallant Back Stays	18	36
1	Fore topgallant Halliard	32	32
2	Pennants of the Fore topgallant Braces	3	3
2	Fore topgallant Bowlings	24	48
2	Fore topgallant Cluelines	22	44
6	Fore topgallant Lanniards	$1\frac{1}{2}$	9
2	Falls of the main topgallant Tackles	7	14
39			

2 Falls

2 Falls of the Main Topgallant Backſtays	20	40
2 Main Topgallant Lifts	24	48
2 Main Topgallant Braces	28	56
2 Main Topgallant Bowlings	24	48
8 Mizon Brails	8	64
2 Mizon Topmaſt Tackle Falls	9	18
1 Fall of the Mizon Topſail Cranlines	36	36
6 Mizon Topſail Bowling Bridles	6	6
2 Pennants of the Mizon Topſail Braces	2	2
2 Croſs Jeck Braces	20	40
2 Fore topſail Leech-Lines.	10	20
31		691

3. *Cordage of one Inch* $\frac{1}{10}$ *parts.*

2 Lanniards of the Spritſail ſtanding Lifts	6	6
4 Fore Martlines Legs	22	22
2 Lanniards of the Hoffes for the fore Yard	6	12
8 Lanniards for the Fore topmaſt Shrowds	2	16
2 Fore Topſail Braces	$23\frac{1}{2}$	47
4 Fore Topſail Bowling Bridles	2	8
2 Fore Topgallant Parrel Ropes	2	2
10 Lanniards of the main Topmaſt Shrowds	$2\frac{1}{2}$	25
2 Main Topſail Braces	24	48
2 Main Topſail Leech Lines	12	24
2 Main Topgallant Cluelines	25	50
2 Pennants of the Main Topgallant Braces	2	2
10 Lanniards for the Mizon Shrowds	$2\frac{1}{2}$	25
2 Pennants of the Croſs Jeck Braces	3	3
2 Slings for the Croſs Jeck Yard	3	3
2 Pennants of the Mizon Topſail Cranlines	2	2
1 Mizon Topſail Halliards in 3 parts	28	28
2 Mizon Topſail Cluelines	14	28
61		351

4. *Cordage of 2 Inches $\frac{2}{10}$ parts.*

	Fa.	Fa.
2 Spritſail Braces	16	32
2 Spritſail Cluelines	11	22
1 Spritſail Buntline in 2 parts	21	21
8 Spritſail Topmaſt Shrouds	3	24
2 Pennants of the Spritſail Topſail Tackles	2	2
3 Pennants of the Spritſail Topſail Cranlines	8	8
10 Puttocks of the Spritſail Topmaſt Shrouds	10	10
2 Spritſail Topmaſt Parrel Ropes	2	2
2 Foreſail Martlins Falls	29	58
5 Foreſail Buntlines	16	80
2 Fore Braces	15	30
2 Fore Topſail Lifts	18	36
2 Falls of the fore Topmaſt Backſtays	$4\frac{1}{2}$	9
2 Pennants of the fore Topſail Braces	3	3
1 Lanniard of the fore Topmaſts Stay	5	5
2 Fore Topſail Bowlings	26	52
2 Fore Topſail Buntlines	10	20
2 Pennants of the fore Topgallant Backſtays	4	4
1 Fore Topgallant Tie	$3\frac{1}{2}$	$3\frac{1}{2}$
8 Fore Topgallant Puttocks	8	8
1 Fore Topgallant Stay	18	18
1 Fore Topgallant Top-rope	27	27
6 Fore Topgallant Shrouds	$3\frac{1}{2}$	2
4 Mainſail Martlines Legs	32	32
2 Falls of the main Topmaſt Tackles	$15\frac{1}{2}$	31
2 Lanniards of the main Topmaſt Backſtays	5	10
2 Main Topſail Lifts	$24\frac{1}{2}$	49
2 Main Topſail Buntlines Falls	$17\frac{1}{2}$	35
2 Main Topſail Buntlines Legs	$9\frac{1}{2}$	19
2 Pennants of the main Topgallant Tackles	$2\frac{1}{2}$	$2\frac{1}{2}$
2 Pennants of the main Topgallant Backſtays	4	4
1 Main Topgallant Halliard	37	37
10 Main Topgallant Puttocks	13	13

	Fa.	Fa.
2 Main Topgallant Parrel Ropes	2	2
2 Falls of the Mizon Tackles	16	32
1 Mizon Truſs	12	12
1 Mizon Bowling	5	5
2 Pennants of the Mizon Topmaſt Tackles	2	2
8 Mizon Topmaſt Shrouds	4½	36
1 Mizon Topmaſt Tie	4½	4½
10 Puttocks of the Mizon Topmaſt Shrouds	15	15
2 Mizon Topmaſt Parrel Ropes.	2	2
29		838½

5. Cordage of 2 Inches 6/10 parts.

1 Spritſail Topmaſt Tie	3	3
2 Mainſail Martlins Falls	32	64
2 Main Braces	24	48
8 Main Topgallant Shrouds	4	32
2 Spritſail Garnets	18	36
2 Spritſail Lifts	18	36
2 Pennants of the Spritſail Braces	2	2
2 Spritſail Sheets	17	34
1 Hoſs for the Stay	6	6
2 Fore Topſail Clue Garnets	15	30
2 Foreſail Bowling Bridles	4	4
2 Pennants of the fore Braces	4	4
1 Lanniard of the fore Topmaſt Stay	4	4
2 Falls of the fore Topmaſt running Backſtays	17	34
2 Fore Topmaſt Parrel Ropes	3	3
1 Fore Topmaſt breſt Rope	2	2
6 Mainſail Buntlines	9	54
1 Main Luff Tackle	8	8
1 Fall of the Main-ſail Buntlines	54	54
1 Main Bouling Tackle	8	8
2 Lanniards of the main Yard Hoſſes	6	6
2 Falls of the main Topmaſt running Backſtays	19½	39
2 Main Topmaſt Parrel Ropes	4	4
49		1 Main

	Fa.	*Fa.*
1 Main Topgallant Maſt Stay	14	14
1 Main Topgallant Top Rope	30	30
1 Mizon Tack	2	2
2 Croſs Jeck Lifts	15	30
1 Mizon Topmaſt Top Rope	13	13
16 Lanniards of the Fore Shrowds	4	64
2 Fore Topſail Clue Lines	30	60
24		728

6. Cordage of 3 Inches $\frac{1}{10}$ parts.

1 Spritſail Halliard	17	17
2 Hoſſes for the Spritſail Sheats	3	3
2 Falls of the Boats Tackles for the Foremaſt	32	64
2 Other Falls	22	44
2 Fore Lifts	20	40
2 Fore Bowlings	15	30
2 Pennants of the fore Topmaſt Tackles	4	4
2 Pennants of the fore Topmaſt running Backſtays	3	6
8 Fore Topmaſt Shrowds	$6\frac{1}{2}$	52
10 Eore Topmaſt Puttocks	$2\frac{1}{2}$	25
1 Fore Topmaſt Halliard	35	35
2 Falls of the Boats Tackles for the Main Maſt	35	70
2 Other Falls	23	46
2 Main Lifts	24	48
2 Main Clue Garnets	18	36
2 Pennants of the main Braces	4	4
1 Lanniard of the main Topmaſt Stay	5	5
1 Main Topſail Halliard	44	44
2 Pennants of the main Topſail Braces	3	3
2 Main Topſail Bowlings	27	54
6 Main Topſail Bowling Bridles	2	12
2 Main Topſail Cluelines	35	70
1 Main Topgallant Tie	4	4
2 Runners of the Mizon Tackles	8	16
1 Mizon Halliard	19	19
1 Mizon Sheat	13	13
63		764

7. *Cordage of 3 Inches $\frac{1}{10}$ parts.*

	Fa.	Fa.
2 Spritſail ſtanding Liſts	7	7
1 Fore Topmaſt Stay	12½	12½
2 Fore Topmaſt ſtanding back Stays	15½	31
1 Runner of the Fore topſail Halliards	12	12
20 Lanniards of the main Shrowds	4	80
2 Main Bowlings	17	34
4 Main Bowling Bridles	3	12
1 Main Garnet Fall	29	29
2 Pennants of the main Tackles	4	4
10 Main Topmaſt Shrowds	7	70
2 Pennants of the main topmaſt back Stays	7	14
2 Main topmaſt ſtanding back Stays	18	36
2 Pennants of the Main topſail Braces	4	4
1 Main topmaſt breaſt Rope	2½	2½
2 Pennants of the Mizon Tackles	4	4
1 Mizon Jeer	12	12
1 Mizon Parrel Rope	3	3
56		367

8. *Cordage of 3 Inches $\frac{2}{10}$ parts.*

1 Lanniard of the Fore Stay	5	5
10 Mizon Shrowds	8	80
11		85

9. *Cordage of 4 Inches $\frac{1}{10}$ parts.*

1 Fore Halliards	30	30
3 Fore Parrel Ropes	8	8
1 Luff Hook Rope	7	7
2 Hoſſes for the Fore Yard	6	6
1 Fall of the Fore topmaſt top-Rope	18	18
1 Main Garnet Guy	8	8
3 Main Parrel Ropes	9	9
2 Hoſſes for the Main Yard	8	8
1 Runner for the main Topſail Halliards	14	14
1 Fall of the main top Rope	21	21
10 Main topmaſt Puttocks	3	30
1 Mizon Stay	9	9
27		168

	Fa.	Fa.
10. *Cordage of 4 Inches $\frac{8}{10}$ parts.*		
2 Pennants of the Spritsail Sheets	4	8
2 Foremast runners of the Boats Tackles	13	26
2 Other runners	12½	25
2 Fore Sheets	25	50
1 Fore Topmast Tie	6½	6½
2 Main Mast Runners of the Boats Tackles	14	28
2 Other Runners	13	26
1 Main Topmast Stay.	12½	12½
		182½
11. *Cordage of 5 Inches $\frac{2}{10}$ parts.*		
2 Fore Topsail Sheets	21	42
1 Lanniard of the main Stay	8	8
1 Main Halliard	40	40
2 Main Jeers	25	50
2 Main Sheets	30	60
1 Pennant of the main Garnet	5	5
1 Main Topmast Tie	8	8
1 Mizon Tie.	7	7
		220
12. *Cordage of 5 Inches $\frac{6}{10}$ parts.*		
1 Sling of the Spritsail Yard	2	2
4 Pennants of the Fore Tackles	3½	14
16 Fore Shrouds	10	160
1 Fore Breast Rope	2	2
1 Collar of the fore Stay about the Bousprit	3	3
1 Main Breast Rope	3	3
2 Main Topsail Sheets.	24	48
		232
13. *Cordage of 6 Inches $\frac{1}{10}$ parts.*		
8 Woldings for the Bousprit	5	40
1 Fore Tie	14	14
2 Fore Tacks	12½	25
4 Pennants of the Main Tackles	4	16
20 Main Shrouds	11	220
1 Pennant of of the Main Topmast Top-Rope.		6 6
		321
14. *Cordage of 6 Inches $\frac{5}{10}$ parts.*		
1 Main Tie	13	13
2 Main Tacks	15	30
		43
90		

15. Cordage

15. *Cordage of* 10 *Inches* $\frac{1}{10}$ *parts.*	Fa	Fa.
1 Fore Stay	12	12
1 Collar about the Stem	5	5
1 Pennant of the main winding Tackle	6	6
		23
16 Cordage of 14 *Inches.*		
1 Main Stay.	16	16

4

THe first thing we will begin withal, is, to find the length of the *Main-Mast*, for any Ship whose length at the *Keel*, the breadth at the *Beam*, and the depth in *Hold* is known, which is done two several ways: The first, which is the most rational way, is to add the breadth and the depth of the Ship together, and double it, and Divide the Product by 3, and the Quotient is the length of the *Main-Mast* in Yards. Example in the Ship we have propounded, the breadth 29½, the depth 13 Foot, those 2 added is 42½, the double of 42½ is 85; that divided by 3, the Quotient is 28⅓ Yards, that is 85 Foot; but we have propounded our *Mast* to be but 84 Foot.

A second way is thus; add the length of the *Keel*, the breadth of the *Beam*, and the depth together, and to that sum add the difference between the breadth and twice the depth, and multiply the whole sum by the breadth at the *Beam*, and the Product divide by the former whole sum, and the Quotient is the length of the *Main-Mast* in Yards. Example, in the Ship we have propounded the length of the *Keel* to be 75 Foot, the breadth of the *Beam* 29½ Foot, and the depth 13 Foot, added together, the sum is 117½, unto which add the difference between twice the depth 26, and the breadth 29½, which divided by 121 the former whole sum, the Quotient is 29½ Yards, which is a Yard more, and better than it was the other way; but it is too long, and therefore we commend the first way for the more rational way, and do perswade those that have occasion to make use of that way.

Now having found the length of the *Main-Maſt* in this manner for any Ship; we have ſet down a Table of the lengths and thickneſs of all the *Maſts* and *Yards* of the Ship we have propounded, by means whereof, after the length and thickneſs, at the partners of the *Main-Maſt* for any Ship is found. The lengths and thickneſs of all the other *Maſts* and *Yards*, may be found out by our Table as followeth: Suppoſe a Ship 63 Foot by the *Keel*, 25 Foot at the *Beam*, and 11 Foot deep in *Hold*; we deſire to know the length and thickneſs of all the *Maſts* and *Yards*: and firſt for the the *Main-Maſt*, the breadth at *Beam* 25 Foot, the depth 11 Foot, their ſum 36, their double 72, which divided by 3, the Quotient is 24 Yards, the length of the the *Main-Maſt*, which is 72 Foot. To find the lengths and thickneſs of all the other, you may do it by the *Rule of Three*, the lengths in Feet, and the thickneſs in Inches, and the Proportion is from the lengths and thickneſs of the *Maſts* and *Yards*, for they are but a lineal Proportion: That is,

As 84, the length of our *Main-Maſt* in the Table is to 72, the length of the *Main-Maſt* found, ſo is 28, the thickneſs of our *Main-Maſt* in the Table to 24, the thickneſs of the *Main-Maſt* found at the Partners; the thickneſs, or the Diameter at the Houns muſt be $\frac{2}{3}$ two third parts of that which it is at the Partners, which in this is 16 Inches thickneſs or Diameter. Or this proportion of the lengths of the Maſts may be abbreviated, for it is as 7 to 6, ſo is 28 to 24; and ſo we may proceed to find all the reſt, as 7 to 6, ſo is 75 our *Fore-Maſt* to 74, the length of the *Fore-Maſt* required; and ſo we may proceed for all the other lengths and thickneſs both of the *Maſts* and *Yards*: But becauſe this is ſomewhat troubleſome, and every one is not able to work the *Rule of Three* in Numbers; we have conſidered of a more eaſie and ſpeedy way for the performing of it, which is by an opening Scale, having two Lines drawn, one on each ſide from the Centre, each Line divided into 150 Parts: and each Part into two parts, whoſe uſe is thus; take 72 from the Centre on one ſide of the Scale in your Compaſſes the length of the *Main-Maſt* found, and put it over in 84, and 84 the length of our *Main-Maſt* in the Table, and keeping the Scale ſtill at the ſame

diſtance

diſtance without altering it, take the diſtance over with your Compaſſes between 28, and 28 the thickneſs of our *Main-Maſt* in the Table, and meaſure it on the ſide of the Scale from the centre, and it will end in 24, the thickneſs of the *Maſt* ſought; and take it over in 75 the length of our *Fore-Maſt*, and it will end in 64 the length of the *Fore-Maſt* required, and take it over in 25, the thickneſs of our *Fore-Maſt*, and it will end in $21\frac{1}{2}$, the thickneſs of the *Fore-Maſt* required; and in 74 the length of the *Main-Yard* in the Tables, and it will end in 63, the length of the *main Yard* required; and in 24 for the thickneſs, and it will end in 21, the thickneſs required: and ſo proceed for all the reſt of the lengths & thickneſs without altering the Scale, and you ſhall find 56 the length of the *Bowſprit* & 19 in thickneſs, and 53 the length of the *Fore-Yard*, and $17\frac{1}{2}$ the thickneſs, and 44 the length of the *Mizon-yard*, and 13 thickneſs, and 45 the length of the *Mizon-Maſt*, and 15 the thickneſs, and 43 the length of the *Spritſail-yard*, and 14 the thickneſs, and 36 the length of the *Main Top-maſt*, and 12 the thickneſs, and $31\frac{1}{2}$ the length of the *fore top-Maſt*, and 11 the thickneſs, and 31 the length of the *Main Top-Sail*, and *Croſsjeck-yards*, and 9 the thickneſs of the *Main Topſail yard*, and $6\frac{1}{2}$ the thickneſs of the *Croſsjeck-yard*, and 27 the length of the *Fore Topſail-yard*, and $7\frac{1}{2}$ the thickneſs, and $23\frac{1}{2}$ the length of the *Mizon Topmaſt*, and $6\frac{1}{2}$ the thickneſs, and $18\frac{1}{2}$ the length of the *Main Topgallant-maſt* and 6 the thickneſs, and $17\frac{1}{2}$ the length of the *Mizon Topſail-yard*, and $4\frac{1}{4}$ the thickneſs, and 17 the length of the *Fore Topgallant-Maſt*, and 5 the thickneſs, and 16 the length of the *Main Topgallant-yard*, and 5 the thickneſs, and $14\frac{1}{2}$ the length of the *Fore Topgallant-yard*, and $14\frac{1}{4}$ the thickneſs, and $14\frac{1}{2}$ the length of the *Spritſail Top-Maſt*, and $4\frac{1}{4}$ the thickneſs, and 12 the length of the *Spritſail Topſail-yard*, and $3\frac{1}{2}$ the thickneſs. By this means we have performed the finding the lengths and thickneſs of all the *Maſts* and *Yards* belonging to our ſuppoſed Ship of 63 Foot by the *Keel*, 25 Foot by the *Beam*, and 11 Foot deep in *Hold*, with wonderful eaſe and ſpeed, very exactly; and now we will go forwards, firſt, to find the ſizes of our Rigging; Secondly, to find the quantity of Rope of each ſize that will ſerve our turn to Rigg the Ship completely:

completely : and thirdly, to find the length of each Rope that we ſhall have occaſion to make uſe of in Rigging : all which ſhall be performed with as much eaſe and ſpeed as the former was for the *Maſts* and *Yards*, (number for number.) Here note by the way, that we could have given the lengths of all the *Maſts* and *Yards* by Proportions from the length of the *Main-Maſt*, and ſo from one to another; but becauſe our way that we have propounded, is far more eaſie and ſpeedy in performance, I rather make uſe of it than of the other way.

Now firſt for the ſizes of our Rigging, we are to conſider that it is but a Lineal Proportion between the Diameter of the *Main-Maſt* in our Table, and the Diameter of the *Maſt* found, which Proportion is, being abbreviated, as 7 to 6, ſo is one Inch one tenth part the ſmalleſt Cordage in our Table, to nine tenths of one Inch our ſmalleſt Cordage for our ſuppoſed Ship of 63 Foot by the *Keel* : and here we are to note, that it is the Circumference of the Cordage that we find, all which is performed without altering the Scale; But let it remain at the ſame opening it was at, to find the lengths and thickneſs of the *Maſts* and *Yards*. As for the ſmalleſt Cordage of one Inch, and one tenth part, take the diſtance over between 11 and 11, which meaſured from the Center, will end in 9, and more almoſt one half, which is 9 tenths of one Inch, and then put it over in 13, and 13 for our ſecond ſize Cordage of one Inch and $\frac{3}{10}$ in our Table, which meaſured from the Center, will end in 11, which is one Inch, and one tenth part for our ſecond ſize for our ſuppoſed Ship, and ſo proceeding on the ſame manner for all the reſt of our ſizes, taking for one Inch, and $\frac{8}{10}$ parts 18, and for two Inches and $\frac{2}{10}$ parts 22, and for two Inches $\frac{6}{10}$ parts 26, and for 3 Inches $\frac{1}{10}$ part 31, and ſo in like manner for all the reſt, and taking for 14 Inches, 140.

But here it may be objected, that the greateſt Cordage in our Table is but 14 Inches, and the extent of our Scale is but to 150; how then ſhall we do if we were to fit a Ship, whoſe ſize of Cordage would go beyond the end of our Scale? to which I anſwer, it may be done three ways : Firſt, it may be done by the *Rule of Three* in Numbers; or elſe, Secondly, (which is more

more pertinent to our way of performing) by the Scale, which is thus; I have a Ship to be Rigg'd, the thickneſs of whoſe *Main Maſt* at the Partners is 35 Inches, I demand the ſize of the *Main Stay*, the ſize of the *Main Stay* in our Tables is but 14 Inches, this that we ſeek for muſt be more, the Proportion between the thickneſs of the *Maſts* is as 28 to 35, which is as 4 to 5. In this caſe becauſe our Scale goes but 150, we take the diſtance over between 70 and 70, which is half the ſize of our *Main Stay*, and meaſure it from the Centre, and it will end in $87\frac{1}{2}$, that is half the circumference of the *Main Stay* required, which being doubled is 175, that is 17 Inches and one half, the circumference of the *Main Stay* required.

A third way by the Scale, we may take the diſtance over between 14 and 14, as the Scale is numbred, which meaſured from the Centre, will end in $17\frac{1}{2}$, the ſize of our *Main Stay* required.

But to go forwards to find the reſt of the ſizes of the Cordage for our ſuppoſed Ship of 63 Foot by the *Keel*.

For our Cordage of one Inch $\frac{8}{10}$ in our Table, we ſhall find by the Scale one Inch $\frac{4}{10}$ parts, and for two Inches $\frac{2}{10}$ parts, we ſhall find one Inch $\frac{6}{10}$ parts, and for two Inches $\frac{4}{10}$, we ſhall find two Inches $\frac{2}{10}$ parts, and for three Inches $\frac{1}{10}$, we ſhall find two Inches $\frac{6}{10}$ parts, and for three Inches $\frac{5}{10}$, we ſhall find three Inches $\frac{0}{10}$ parts, and for three Inches $\frac{9}{10}$, we ſhall find three Inches $\frac{4}{10}$, and for four Inches $\frac{4}{10}$ parts, we ſhall find three Inches $\frac{8}{10}$ parts, and for four Inches $\frac{8}{10}$ parts, we ſhall find four Inches $\frac{1}{10}$ parts, and for five Inches $\frac{2}{10}$ parts, we ſhall find four Inches $\frac{4}{10}$ parts, and for five Inches $\frac{6}{10}$ parts, we ſhall find four Inches $\frac{8}{10}$ parts, and for ſix Inches $\frac{1}{10}$ part, we ſhall find five Inches $\frac{2}{10}$ parts, and for ſix Inches $\frac{5}{10}$ parts, we ſhall find five Inches $\frac{5}{10}$ parts, and for ten Inches $\frac{0}{10}$ parts, we ſhall find nine Inches $\frac{0}{10}$ parts, and for fourteen Inches we ſhall find twelve Inches $\frac{0}{10}$ parts: So now we have ſized all our Cordage for our ſuppoſed Ship of 63 Foot by the *Keel*, for Rigging proportionable to the ſizes of the Cordage in our Table.

The ſecond thing concerning the Cordage, is to find what quantity of each ſize will ſerve to Rigg our ſuppoſed Ship of 63 Foot

Foot by the *Keel.* You may ſee in our Table we have ſet down the ſum of the number of Fathoms of each ſize at the end or concluſion of the ſize, as for the firſt ſize of one Inch and one tenth part, the ſum is 232 Fathoms; But becauſe this number is greater than the length of our Scale, we take the tenth part of it, and ſo we take it over between $23\frac{1}{4}$, and $23\frac{1}{4}$ the Scale remaining ſtill at the ſame angle, or opening it as it was at the firſt, and meaſuring it from the Centre, it will end in very near 20, which being again increaſed or multiplyed by 10, it will be 200 Fathom for the Cordage of the leaſt ſize, to Rigg our ſuppoſed *Ship* completely.

For our ſecond ſize which in our Table is 691 Fathom, we ſhall find 59, which is 590 fathom; and for our third ſize which is in the Table 351 fathom, we ſhall find 30, which is 300 fathom; and for our fourth ſize which is in the Table 838 fathom, we ſhall find $71\frac{1}{2}$, which is 715 Fathom; and for our fifth ſize which is in the Table 728 fathom, we ſhall find $62\frac{1}{2}$, which is 625 fathom; and for our ſixth ſize which is in the Tables 764 fathom, we ſhall find $65\frac{1}{2}$, which is 655 fathom; and for our ſeventh ſize which is in the Table 367 fathom, we ſhall find $31\frac{1}{2}$, which is 315 fathom; and for our eighth ſize, which is in the Tables 85 fathom, we ſhall find 72, which is 72 fathom; and for our ninth ſize, which is in the Tables 168 fathom, we ſhall find $14\frac{1}{2}$, which is 145 fathom; and for our tenth ſize, which is in the Tables 182 fathom, we ſhall find $15\frac{1}{2}$, which is 155 fathom; and for our eleventh ſize, which is in the Tables 226 fathom, we ſhall find 19, which is 190 fathom; and for our twelfth ſize, which is in the Tables 232 fathom, we ſhall find 20, which is 200 fathom; and for our thirteenth ſize, which is in the Tables 321, we ſhall find $27\frac{1}{2}$, which is 275 fathom; and for our fourteenth ſize, which is in the Tables 43 fathom, we ſhall find 37, which is 37 fathom; and for our fifteenth ſize, which is in the Tables 23 fathom, we ſhall find 20, which is 20 Fathom; and for our laſt ſize, which is in the Tables 16 fathom, we ſhall find 14 fathom.

But here it will be objected, that in our Tables we have put down too much variety of Rigging, and that there is not ſo much required

required for every ordinary Ship : For answer whereunto, and what course to take where any man is not disposed to have his Ship so completely Rigged as we have propounded, go to the Tables, and take out the numbers that are against the Cordage of every size that you intend to make use of, and add these numbers together, then take over the distance in your Compasses from the Scale of the whole sum, or the tenth part, as you have occasion, as is before directed, and measure it from the Centre, and you shall see the number of fathoms required of that size, although you Rigg not your Ship so completely as we have propounded, always remembring the Scale must remain still at the same opening as was at the first.

Example.

Suppose our supposed Ship of 63 foot by the *Keel*, it being Winter, should not be Rigged with *Topgallant-Masts*, nor with *Mizon* nor *Spritsail Topmasts*, then we would know how many fathom of our fourth size Cordage will serve our turn; we go to our Table of 2 Inches $\frac{2}{10}$ parts, and take out the numbers against all the other Cordage (leaving out that which is for the *Topgallant Masts*, and the *Mizon* and *Spritsail Topmasts*) and add them together, and the sum is 590, of which I take the tenth part, which is 59. Then I take over the distance with my Compasses upon the Scale, between 59 and 59, and measure it from the Centre, and it ends in $50\frac{1}{2}$, which is 505 fathom of Cordage of our fourth size of one Inch $\frac{9}{10}$ parts, which was the sixth size, we found for 2 Inches $\frac{2}{10}$ parts, as you may see before.

Now to proceed to the finding of each particular Cords length, there is no more difficulty in it then there was in the finding of the whole number of fathoms of each size : But for the better explaining of it, we will set down some Examples of some Cords, that the rest may be found by them without any scruple.

Example.

We desire to know the length of our *Main Topsail Braces* for our supposed Ship of 63 foot by the *Keel*, looking in our Table, we find them in our third size of 1 Inch $\frac{4}{10}$ parts, and their length double is 45 fathom (note in our Table every Cord that is double is put down single and double with *Fa.* at the top of each signifying

fying fathoms) ſo I take over the diſtance with the Compaſſes upon the Scale over between 48 and 48, which meaſured from the Centre, ſhall end in 41, that is 41 fathom for the length of our *Main Topſail Braces* double, for our ſuppoſed Ship of 63 foot by the *Keel*; and ſo if we look for our *Fore Topſail Lifts*, we ſhall find them to be in our Table of Cordage of two Inches $\frac{2}{10}$ parts, 36 fathom; and for our ſuppoſed Ship we ſhall find them to be 31 fathom; and for our *Topſail Cluelines* in our Table of 2 Inches $\frac{6}{10}$ parts, we ſhall find 60 fathom, which for our ſuppoſed Ship we ſhall find to be 51 fathom; and for our *Fore-lifts* which in our Table is 40 fathom, we ſhall find them for our ſuppoſed Ship to be by our Scale 34 fathom; and for our *Main Topſail Halliards*, in our Table we ſhall find 44 fathom, which for our ſuppoſed Ship by our Scale we ſhall find to be 37 fathom; and for our *Main Bowlings*, in our Table is 34 fathom, which we ſhall find by our Scale to be 29 fathom; and for our *Fore-Halliards*, in our Table is 30 fathom, which we ſhall find by our Scale to be 26 fathom.

Thus we have exemplifyed in the finding of the lengths of ſome particular Cords, which is inſtruction ſufficient for the finding of the lengths of all the reſt, ann ſo we ſuppoſe we have performed all that we promiſed to perform with eaſe and ſpeed by a Scale, for the complete Rigging of any Ship; and now we will proceed to ſet down ſome other proviſions and Cordage that are neceſſarily required in a Ship, and ſo we will conclude this Tract.

A Table of ſome other Cords *and* Ropes *that are of neceſſity in a Ship, and are here put down for their Lengths and Sizes according to our former Table of Cordage for our propounded Ship.*

	Fa.	*Fa.*
2 Stoppers at the Bitts of 5 Inches	4	8
2 Lanniards of 2 Inches	5	10
2 Stoppers at the Bough of 3 $\frac{1}{2}$ Inches	6	12
4 Shank Panters of 3 $\frac{1}{2}$ Inches	2 $\frac{1}{2}$	10
1 Shank Panter for the Stream Ankor 3 Inches	2 $\frac{1}{2}$	2 $\frac{1}{2}$

1 Stopper

1 Stopper for it of 3 Inches	2½	2½
2 Can Buoy Ropes of 3 Inches	50	100
For Robins and Earins of 1½ Inch. 1 Small Coil		
4 Lead-lines		
2 Cat Ropes of 3 Inches	2½	5
1 Pennant of the Fiſh Tackle 4½ Inches	4	4
1 Fall of the Fiſh Tackle 2 Inches	12	12
1 Long Boats Davids ſeazing 3 Inches	2	2
1 Long Boats Panter 4 Inches	3	3
1 Pinneſſes Davids ſeazing 2½ Inches	2	2
1 Pinneſſes Panter 3 Inches	3	3
1 Jellewats Panter 2 Inches	2	2
Hoſſes for the Head 3 Inches	4	4
1 Ladder for the Bouſprit 2½ Inches	8	8
Lanniards of 1 Inch	4	4
1 Buoy Rope for the Stream Ankor 3 Inches	9	9
1 Buoy Rope for the Kedge Ankor 2 Inches	9	9
2 Pair of Butt Slings 3 Inches	2	2
2 Pair of Hogſhead Slings 2 Inches	2	2
1 Ladder for the Poop 3 Inches	8	8
6 Winding Tackle Blocks		
3 Buoy Ropes of 4 Inches	10	30
For new Bolt Rope 4 Inch Cablet		
A Gueſs Rope 3 Inch Cablet		
Cackling of 2½ or 3 Inches.		

50

YOU are to take notice that theſe laſt Cords and Ropes are ſized, and their Lengths are proportioned according to our Ship that we have propounded of 75 foot by the *Keel*, for which our former Tables are made. Now it remains that we ſpeak ſomewhat of the ſizing of Cables.

Your Sheat Cable is commonly ſo many half Inches about as your Ship is breadth in Feet at the Mid-ſhip Beam.

Now our propounded Ship to which our Tables are made, is 29½ foot at the Mid-ſhip Beam, therefore the Sheat Cable muſt be 15 Inches about; and to find the ſizes of the reſt of your Cables, you may do it by the weight of your Ankors in this manner.

Suppoſe your Sheat Ankor be 15 hundred weight, and your Cable 12 Inches, and you have another Ankor 9 hundred weight, you deſire the ſize of your Cable for it.

For the anſwer to this and the like demands, I have cauſed two Lines to be put down on the ſide of the Scale; the one of equal parts containing 385 parts, and the tens and fives drawn out, and it is numbred at every 50, thus, 50, 100, 150, *&c.* The other Line of unequal parts begins at 1, and ends at $27\frac{7}{10}$, and is numbred to every unite, and each unite is divided from 5 to 10 by fives, from 10 to $27\frac{7}{10}$ by tens, each unite into ten parts.

Firſt, I take 9 upon the opening Scale from the Centre, the weight of the ſecond Ankor, and put it over in 15, and 15 the weight of the firſt Ankor, and keeping the Scale ſo, I look againſt 12 in the unequal parts, and in the equal parts againſt it are 72. Then I take the diſtance over upon the opening Scale between 72, and 72, and meaſure it from the Centre, and it ends in $43\frac{1}{2}$. Laſtly, I look $43\frac{1}{2}$ in the equal parts, and againſt it in the unequal parts is $9\frac{7}{10}$ that is $9\frac{7}{10}$ Inches the Circumference of the Cable for the Ankor of 9 hundred weight, which was required.

Or otherwiſe the Cables may be proportioned from the burden of the Ships, in this manner.

Suppoſe that a Ship of 300 Tun have a Sheat Cable of 15 Inches about, what ſhall be the Circumference about of the Sheat Cable of a Ship of 115 Tun? Here becauſe the greater number of Tuns is more than is upon our Scale, we take one quarter of 300, which is 75, and one quarter of 115, which is 29 neareſt, and the Proportion is all one: So I take 29 from the Centre, and put it over in 75, and 75, and ſo keep the Scale. Next, I look againſt 15 in the unequal parts, and againſt it in the equal parts $112\frac{1}{2}$, then I take over the diſtance between $112\frac{1}{2}$, and $112\frac{1}{2}$, and meaſure it from the Centre, and it ends in $43\frac{1}{2}$, then I look againſt $43\frac{1}{2}$, and in the unequal parts againſt it are $9\frac{7}{10}$, that is $9\frac{7}{10}$ Inches, the Circumference about of a Sheat Cable for a Ship of 115 Tun, according to the former ſuppoſition, and as it was found before; and to the ſizes of all the reſt of the Cables may be found from one Ship to another after the ſame manner.

It

It may be objected, that the *Stays* of the middle *Masts* may fail to hold in proportion according to the lengths of the *middle-Masts* in all Ships, because the distance between the *Main-Mast* and the *Fore-Mast* may not be proportionable in all Ships according to their lengths, we suppose it to be so, yet our Scale performs it exactly. *Example.*

In our propounded Ship of 75 foot by the *Keel*, the *Main-mast* 84 foot, the depth in *Hold* 13 foot, and 5 foot between *Decks* is 18 foot, which substracted out of 84, rests 66 foot, the height of the *Mast* above the *Decks*; now commonly the distance between the *Main-mast* and *Fore-mast*, is $\frac{1}{5}$ of the length of the Ships *Keel*, which in this Ship that we have propounded, is 45 foot (and the distance of the *Mizon-mast* from the *Main-mast*, is half as much as the distance between the *Main-mast* and the *Fore-mast*;) But to proceed, and keep our selves within the compass of our Scale, we reduce the height of the *Mast* above the *Decks*, and the distance between the *Main-mast*, and *Fore-mast* into Yards, and the one is 22 Yards, and the other is 15 Yards, these two I seek in the Line of unequal parts, and against 22 there is in the equal parts 242, and against 15 is $112\frac{1}{2}$, these two I add together, and their Sum is $354\frac{1}{2}$, which I seek in the Line of equal parts, and against it in the unequal parts is $26\frac{6}{10}$, that is $26\frac{6}{10}$ Yards, the length of the *main Stay* besides the *Coller*.

If it happen that the equal parts that belong to the height of the *Main-mast* above the *Decks*, and the distance between the *Main-mast* and the *Fore-mast* added together, be above 385, then take the half of each in Yards, and double the length you find, and that shall be the length of the *Main-stay* in Yards.

Example.

The distance between the *Main-mast* and *Fore-mast*, is 15 Yards, for which we take half, which is $7\frac{1}{2}$, against which of the unequal parts in the equal parts is 28, and for the height of the *Main-mast* above the *Decks* being 22 yards, we take 11, against which of the unequal parts in the equal parts is $60\frac{1}{2}$, which added to 28, is $88\frac{1}{2}$, which I look in the equal parts, and against it in the unequal parts is $13\frac{1}{10}$ which being doubled is, $26\frac{2}{10}$, that is, $26\frac{6}{10}$ yards, for the length of the *Main-Stay* besides the *Coller* as it was found before.

Thus

Thus we have finiſhed what was intended for this buſineſs of *Maſting*, *Yarding*, and *Rigging* of any Ship whatſoever. But becauſe our *Boat-ſwain* ſhall be complete according to our title, we ſhall further ſhew by our Scale to find the weight of the Cordage (of each ſize that ſhall ſerve to Rigg any Ship whatſoever) as we will exemplifie it by the Cordage of our ſuppoſed Ship of 63 foot by the *Keel*: Firſt, we are to take notice, that in all our Cordage under $2\frac{6}{10}$ Inches, we are to look the ſize in the unequal parts, and make it ten times as much as it is, as for one Inch and $\frac{1}{10}$ parts to look 15, and to take half the number of equal parts againſt it as againſt 15, is $112\frac{1}{2}$, the half is $56\frac{1}{4}$, and always take 50 from the Centre, and put it over in the ſaid half of the equal parts, then take the diſtance over in $87\frac{1}{2}$, and $87\frac{1}{2}$, and meaſure it from the Centre, and that ſhall be the number of Fathoms of that Cordage that weighs one quarter of one hundred weight.

Example of our third ſize for our ſuppoſed Ship of 63 Foot by the *Keel*, which ſize is 1 Inch $\frac{6}{10}$ parts, taking for it 16, as is before ſaid, and looking it in the unequal parts, there is againſt it in the equal parts 128, the half is 64. Then I put over 50 in 64, and take the diſtance over in $87\frac{1}{2}$, and $87\frac{1}{2}$, and meaſure it from the Centre, and it ends in 68, that is, in 68 Fathom of that Cordage to weigh one quarter of a hundred weight; ſo then I take 28 from the Centre, the number of Pounds in one quarter of a hundred, and put it over in 68, then I take the diſtance over between 30 and 30, the tenth part of the ſum of the Cordage of the third ſize, and meaſure it from the Centre, and it ends in $12\frac{1}{3}$, which multiplyed by 10, is 123 Pound, the weight of 300 Fathom of our Cordage of 1 Inch $\frac{6}{10}$ parts, which is our third ſize.

For Cordage between $2\frac{6}{10}$ Inches, and 5 Inches, take the one half of the ſize, and do with the half as in the laſt, only at the laſt take the diſtance between $43\frac{1}{4}$ and $43\frac{1}{4}$, and meaſure it from the Centre, which ſhall be the number of Fathoms in half one hundred weight; or if you take it between $87\frac{1}{2}$ and $87\frac{1}{2}$, it ſhall be the number of Fathoms in one hundred weight.

Example

Example of our ſeventh ſize Cordage for our ſuppoſed Ship, which is 3 Inches, the half is 1 Inch $\frac{1}{10}$ parts, for which we look 15 in the unequal, and in the equal parts againſt it $112\frac{1}{2}$ the half is $56\frac{1}{4}$; ſo I put over 50 in $56\frac{1}{4}$, and take the diſtance between $43\frac{1}{4}$ and $43\frac{1}{4}$, which meaſured from the Centre ſhall end in 39, that is 39 Fathom to weigh half one hundred weight of 3 Inch Cordage; ſo I put over 20 for two quarters in 39, and then I take the diſtance over between $31\frac{1}{2}$, and $31\frac{1}{2}$ for 315 Fathom, the whole ſum of that Cordage, which meaſured from the Centre, ſhall end in 16, that is, 16 quarters of one hundred weight, that is 4 hundred weight for the quantity of that Cordage; for Cordage above 5 Inches, to find the weight and whole quantity of that, we muſt ſeek the ſize of that in the unequal parts, as it is, and take the equal parts againſt it, and put over 20 in it, then take the diſtance between $87\frac{1}{2}$, and $87\frac{1}{2}$, and meaſure it from the Centre, and it ſhall end in the number of Fathoms that weigheth one half hundred weight.

Example of our fifth ſize, which is 9 Inches, and is 20 Fathom, againſt 9 of the unequal parts in the equal parts, is $40\frac{1}{2}$, I put over 20 in $40\frac{1}{2}$, and take the diſtance between $87\frac{1}{2}$, and $87\frac{1}{2}$, which meaſured from the Centre, ends in 43, that is 4 Fathom, and $\frac{1}{10}$ of that Cordage to weigh half one hundred weight: Then I put over 20 for two quarters in 43, and take the diſtance over between 20, and 20, the number of Fathoms of that ſize, and meaſure it from the Centre, and it ends in $9\frac{1}{3}$, that is, 9 quarters and one third part, or two hundred one quarter and nine pound for the whole quantity of that Cordage. This which is exemplifyed in theſe three particulars, is ſufficient inſtruction for all the reſt. And now having made (in regard of inſtruction) our *Boat-Swain* complete, we leave it to his practice, and ſo conclude.

Poſtſcript.

POSTSCRIPT.

WHereas some object against these Rules by way of Proportion; saying, they cannot hold: For answer to this, I say, that all the Cordage that belongs to the Masts, *shall hold in proportion according to the length of the* Masts *above the first Deck. And for the Cordage that belongs to the* Yards *if the* Yards *be longer or shorter than a proportion given, first find the length of the Cordage belonging to the* Yards, *according to the proportion given: then as the length of the* Yard *according to the proportion given, is to the length of the* Yard *you would have your Cordage for, so is the length of each particular Cordage found (according to the proportion given) to the length of the Cordage for the* Yard *you desire to have it.*

For the weight of Ankors *and* Cables, *they are such things as are Arbitrary, left to the Discretion of the Master, or other that hath to do in the business, according as they find the Built of the* Ship *to be: And the like arbitrary it is in the sizes of some of the Cordage and Ground-Tackle.*

HENRY BOND.

FINIS.